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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,356	08/27/2003	Nobumasa Okada	031079	3407

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ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP
1725 K STREET, NW
SUITE 1000
WASHINGTON, DC 20006

EXAMINER

IVEY, ELIZABETH D

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/648,356

Applicant(s)

OKADA ET AL.

Examiner

Elizabeth Ivey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION***Specification***

The disclosure is objected to because of the following informalities: page 5 lines 25-27 state “ the first layer having a different refractive index from that of the first layer or the second layer.” Since the first layer cannot have a different refractive index from itself, this is statement is in error. Additionally, on page 7 lines 22-23 the specification states “ directly connected with other” it should state “directly connected with each other”. Also, on page 6 line 35 the word difference should be changed to different. Appropriate correction is required.

Claim Objections

Claims 3 and 10 are objected to because of the following informalities: Claims 3 and 10 are not commensurate with the specification, as the specification does not provide a basis for a layer interposed between a first and second layer. The only mention of a layer interposed between layers is on page 7 where a layer is interposed between the layer of magnesium fluoride defined on page 5 as a second layer and the layer of titanium nitride defined on page 5 as a third layer. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 3 and 10 claim another layer interposed between the first and second layers. There is no basis in the specification for this layer, as the specification never mentions an interposed layer between a first and second layer. Additionally, the specification does not provide any information as to the composition, structure or function of this interposed layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-2 and 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0031365 A1 to Anderson et al.

Regarding claims 1-2, and 6, Anderson discloses a multilayer or laminated antireflective or reflection preventing film with three layers of alternating high and low index of refraction materials, in contact with one another (page 7 paragraphs [0075-0076] and Figure 2), creating a plurality of reflection planes, with the second layer being the high index of refraction material titanium oxynitride (page 2 paragraph [0029] and page 7 Table 2). Anderson discloses a first layer with an index of refraction different from the index of refraction of layers 2 or 3 (page 7 Table 2). Although, in the example of table 2, Anderson does not disclose magnesium fluoride in the third layer, Anderson discloses (page 2 paragraph [0017]) that the low index of refraction layers in the antireflective film may be magnesium fluoride among other materials. Although the thickness of the third layer is not specified as $\frac{1}{4}$ wavelength, it would have been obvious to a person of ordinary skill in the art at the time of the invention to adjust the layer thicknesses for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Regarding claim 4, Anderson discloses the second layer sandwiched between the first and third layers (page 7 paragraph [0075] and Figure 2). Anderson does not disclose a first layer containing magnesium fluoride in the example but discloses (page 2 paragraph [0017]) that the low index of refraction layers including the first layer in the antireflective film may be one or more of silicon oxide, aluminum oxide, aluminum oxyfluoride, aluminum fluoride, and magnesium fluoride.

Regarding claim 5, Anderson does not specifically disclose silicon oxide as a first layer of the antireflective film, but discloses (page 2 paragraph [0017]) that the low index of refraction layers including the first layer in the antireflective film may be silicon oxide.

Regarding claim 7, claim 7 is a product by process claim wherein the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *See MPEP 2113*. As such, the process limitation of ion-assisted deposition within claim 7 does not provide patentable distinction over the prior art.

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Claims 8-9, 11-14, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0031365 A1 to Anderson et al. in view of U.S. Patent 5,777,792 to Okada et al.

Regarding claims 8-9 and 13-14, Anderson discloses optical multilayer or laminated antireflective films with three and four layers of alternating high and low indices of refraction materials, in contact with one another (page 6-7 paragraphs [0074-0076], Figures 1 and 2 and Tables 1 and 2), creating a plurality of reflection planes, with the second layer being the high index of refraction material titanium oxynitride (page 2 paragraph [0029] and page 7 Tables 1 and 2). Anderson discloses a first layer with an index of refraction different from the index of refraction of layers 2 or 3 (page 7 Table 2). Although, in the example of table 2, Anderson does not show magnesium fluoride in the third layer, Anderson discloses (page 2 paragraph [0017]) that the low index of refraction layers in the antireflective film may be magnesium fluoride among other materials. Although the thickness of the third layer is not specified as $\frac{1}{4}$ wavelength, it would have been obvious to a person of ordinary skill in the art at the time of the invention to adjust the layer thicknesses for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Anderson does not disclose the use of this antireflective film in a semiconductor device; however, Okada discloses the use of materials such as titanium oxynitride, in an antireflective film on an optical semiconductor device such as a laser which is a light emitting device with a light emitting plane. Okada also discloses the use of ion-assisted deposition of titanium oxynitride to provide a high refractive index layer of acceptable refractive index, absorption and lifetime suitable for semiconductor device applicability (column 1 lines 45-48, column 2 lines

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27-31 and column 3 lines 25-42). Because Okada expresses the advantage of having an antireflective film with the high index of refraction material formed by ion-assisted deposition, it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the structure of Anderson's antireflective layer with the use of ion-assisted deposition of the titanium oxynitride layer to create the optical semiconductor device with an optical multilayer film.

Regarding claim 11, Anderson discloses the second layer sandwiched between the first and third layers (page 7 paragraph [0075-0076] and Figure 2). Anderson does not disclose a first layer containing magnesium fluoride but discloses (page 2 paragraph [0017]) that the low index of refraction layers in the antireflective film may be one or more of silicon oxide, aluminum oxide, aluminum oxyfluoride, aluminum fluoride, and magnesium fluoride.

Regarding claim 12, Anderson does not specifically disclose silicon oxide as a first layer of the antireflective film, but discloses (page 2 paragraph [0017]) that the low index of refraction layers in the antireflective film may be silicon oxide. Because Anderson indicates the low index of refraction materials are interchangeable, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use silicon oxide as a first layer option.

Regarding claim 20, in table 1 Anderson discloses a film with a fourth layer having a higher index of refraction than the first layer.

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Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0031365 A1 to Anderson et al. in view of U.S. Patent 5,777,792 to Okada et al. as applied to claim 8 above, and further in view of U.S. Patent 6,222,967 B1 to Amano et al.

Regarding claim 15, the combined teachings of Anderson and Okada disclose all of the aspects of claim 8 but do not disclose a resin sealing at least the light incident plane of the optical semiconductor device. Amano discloses a resin sealing structure of an optical module (column 31 lines 2-11) on a device such as an optical semiconductor (column 1 lines 55-59). Amano discloses this is important to seal the device to achieve reliability (column 1 lines 31-32) and in some cases to improve dimensional accuracy of alignment of multiple optical components. (column 3 lines 20-25). It would therefore be obvious to a person of ordinary skill in the art at the time of the invention to combine the resin seal of Amano with the combined optical semiconductor disclosure of Anderson and Okada to create a reliable optical semiconductor device with the ability to align well with other optical components.

Claims 16-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0031365 A1 to Anderson et al. in view of U.S. Patent 5,777,792 to Okada et al.

Regarding claims 16-17 and 19, Anderson discloses an optical multilayer or laminated antireflective film with three layers of alternating high and low index of refraction materials, the high refractive index material being titanium oxynitride and the low refractive index materials being magnesium fluoride or silicon oxide among other compositions (page 7 paragraph [0075-

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0076]). Anderson does not disclose the use of this antireflective film in an optical semiconductor device, however, Okada discloses the use of materials such as titanium oxynitride, in an antireflective film on a in an optical semiconductor device such as a laser which is a light emitting device with a light emitting plane. Okada also discloses the use of ion-assisted deposition of titanium oxynitride to provide a high refractive index layer of acceptable refractive index, absorption and lifetime for semiconductor device applicability (column 1 lines 45-48, column 2 lines 27-31 and column 3 lines 25-42). Because Okada expresses the advantage of having an antireflective film with the high index of refraction material formed by ion-assisted deposition, it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the structure of Anderson's antireflective layer with the use of ion-assisted deposition of the titanium oxynitride layer to create the optical semiconductor device with an optical multilayer film as disclosed in the applicant's specification. Although neither Anderson nor Okada disclose the optical characteristics, such as optical transmission, exhibited by either causing or not causing a refractive index difference between an outermost layer and the air or an inert gas and neither show the characteristics to be the same, and neither disclose optical characteristics where another material is provided in contact with the outer most layer of the optical multilayer film, because the composition and structure of the device in the applicant's disclosure is the same as the disclosure in the combined prior art, the device would inherently exhibit the properties, such as optical transmission of the claimed inventions in claims 16 and 17. *MPEP 2112.02.*

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Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application 2001/0031365 A1 to Anderson et al. in view of U.S. Patent 5,777,792 to Okada et al., as applied to claim 16 above, and further in view of U.S. Patent 5,912,504 to Yoshizawa et al.

Regarding claim 18, the combined teachings of Anderson and Okada disclose all of the aspects of claim 16 considering the inherent properties of the materials but do not disclose a resin sealing at least the light incident plane of the optical semiconductor device. Yoshizawa discloses a semiconductor device in the form of a photo sensor sealed by a light transmitting resin. Yoshizawa discloses that this resin seals the device but will not impede the light transmission (column 2 lines 34-56). Because it is important to seal a device for protection while maintaining the transmission characteristics, it would be obvious to a person of ordinary skill in the art at the time of the invention to combine the resin seal of Yoshizawa with the combined optical semiconductor disclosure of Anderson and Okada to create an optical semiconductor device in which the electrical signal is not attenuated. Additionally, because the resin causes no degradation of optical properties, the device would inherently exhibit the properties of the claimed invention according to *MPEP 2112.02*.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Ivey whose telephone number is (571) 272-8432. The examiner can normally be reached on 7:00- 4:30 M-Th and 7:00-3:30 alt. Fridays.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571) 272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elizabeth D. Ivey

Elizabeth D. Ivey

Cathy Lam

**CATHY LAM
PRIMARY EXAMINER**

05-23-2005